Yiming Che

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PROFESSIONAL SKILLS & KNOWLEDGE

- **Programming Languages:** Python, Matlab, R
- **Skills:** Linux, Slurm, Git/GitHub, MySQL, PySpark, Pandas, Bash, PyTorch/TensorFlow SKlearn, Hugging Face, Docker, AWS, MLflow, CI/CD
- **Research Interests:** Generative models, Medical imaging, Bayesian statistics, Active learning

EDUCATION BACKGROUND

- **Binghamton University, State University of New York, NY, United States**
  Department of Systems Science and Industrial Engineering
  Doctor of Philosophy in Systems Science — May 2023
- **Binghamton University, State University of New York, NY, United States**
  Department of Systems Science and Industrial Engineering
  Master of Science in Industrial Engineering — May 2018
- **Capital University of Economics and Business, Beijing, China**
  Department of Industrial Engineering
  Bachelor of Science in Industrial Engineering — July 2017

PROFESSIONAL EXPERIENCE

- **Postdoctoral Scholar at Arizona State University** (Advised by Dr. Teresa Wu)
  July. 2023 - Present, Tempe, AZ
  - **Diffusion Models on Medical Imaging**
    - Developed a fully weakly-supervised anomaly detection/segmentation framework (AnoFPDM) using guided diffusion models. Achieved state-of-the-art performance on lesion segmentation with DICE score 77.4 on BraTS21 dataset, eliminating pixel-level labels for hyperparameter tuning, which significantly reduces the annotation cost.
    - Developed a high-resolution PET image synthesis strategy using latent diffusion models and low-dose PET image. Achieved correlation 0.94 between synthesized PET image and digital phantoms. Reduced the need for high-dose PET scans, minimized patient radiation exposure and enabled low-dose PET imaging to achieve high-resolution results, making scans more accessible and affordable.
    - Developing diffusion models with asynchronous variance schedule to increase signal strength of anomaly regions on anomaly map for robust lesion segmentation (working project).
  - **Multi-modality (Text and Image) Models for Headache Diagnosis**
    - Preprocessed and tokenized clinical notes from Mayo Clinic.
    - Finetuned BioMedCLIP model for headache diagnosis using patient's MRI and clinical notes. Achieved state-of-the-art performance in headache diagnosis with 0.96 AUC. Reduced misdiagnosis rates, potentially saving hospitals and insurance companies on unnecessary treatments.
    - Finetuned solely on text encoder PubMedBERT and vision encoder pretrained ViT for comparison.
- **Research Scientist at ASU-Mayo Center for Innovative Imaging**
  July. 2023 - Present, Tempe, AZZZ
  - **GAN-based Models for Image Harmonization**
    - Modified Cycle-GAN for unpaired harmonization between FBP and PiB tracer in amyloid PET images. Achieved correlation coefficient 0.97 between two tracers after harmonization. Reduced need for repeated scans to lower costs for hospitals and patients.
    - Utilized Cycle-GAN for unpaired harmonization between CT and MRI to boost the performance of multi-modality classification. Achieved ∼16% AUC improvement in classification performance with real CT and synthetic MRI.
  - **Machine Learning for Cognitive Decline Prediction**
    - Preprocessed and analyzed patients's cognitive data in Python. Performed feature selection and model selection from XGBoost, random forest, logistic regression, QDA and SVM with nested cross-validation.
    - According to the feature importance (SHAP Value) and statistical test (Wald test), a set of features are regard as the most important features for cognitive decline prediction. These findings are new insights for the clinical research.

- **Research Assistant at Binghamton University** (Advised by Dr. Changqing Cheng)
  Aug. 2017 - May 2023, Binghamton, NY
  - **Physics-informed Neural Network (PINN) for Covid-19 Outbreak Prediction**
    - Integrated a Bayesian framework into traditional PINN for enhanced robustness and uncertainty quantification. Provided confidence intervals for predictions and improved reliability over non-Bayesian PINNs for more trustworthy decision-making process.
  - **Bayesian Modeling and Active Learning/Sequential Design**
    - Developed a novel Bayesian surrogate model which combines generalized polynomial chaos and stochastic kriging model for efficient surrogate modeling of stochastic systems. Achieved ∼90% improvement in computational budget without loss of accuracy compared to traditional Monte Carlo simulation.
    - Developed single-section and batch-selection sampling algorithms with Gaussian process. Achieved ∼70% improvement in computational efficiency compared to traditional one-shot design.
  - **Uncertainty Quantification for Machining Process**
    - Developed uncertainty quantification framework using generalized polynomial chaos expansion for machining process. Achieved ∼80% improvement in computational efficiency compared to Monte Carlo simulation.

AWARD & HONOR

- 2023 Distinguished Dissertation Award, Binghamton University **(top 1%)** 2024
- Excellence in Systems Science Research Award, Binghamton University 2023
- INFORMS Bonder Foundation Award 2021
- Finalist, IISE-DAIS Mobile App Competition at 2021 IISE Annual Conference and Expo 2021
- Binghamton University Graduate Student Excellence Award in Research **(top 1%)** 2021

SELECTED PUBLICATIONS

Summary: 14 publications, including 8 first-author papers (13 journal articles, 1 conference paper).

1. **Che, Y.**, Rafsani, F., Shah, J., Siddiquee, M. M. R. and Wu, T. "AnoFPDM: Anomaly segmentation with forward process of diffusion models for brain MRI" *Proceedings of the Winter Conference on Applications of Computer Vision. 2025.* https://arxiv.org/abs/2404.15683
2. Shah, J., **Che, Y.**, Sohankar, J., Luo, J., Li, B., Su, Y. and Wu, T. "Enhancing PET quantification: MRI-guided super-resolution using latent diffusion models" *Life* 14.12 (2024): 1580. https://doi.org/10.3390/life14121580
3. Wan, J., Kataoka, J., Sivakumar, J., Pena, E., **Che, Y.**, Sayama, H. and Cheng, C. "Sparse Bayesian learning for sequential inference of network connectivity from Small Data" *IEEE Transactions on Network Science and Engineering* 11.6 (2024): 5892-5902. https://doi.org/10.1109/TNSE.2024.3471852
4. **Che, Y.**, Guo, Z. and Cheng, C. "Generalized polynomial chaos-informed efficient stochastic Kriging," *Journal of Computational Physics* 445 (2021): 110598. https://doi.org/10.1016/j.jcp.2021.110598
5. **Che, Y.** and Cheng, C. "Active learning and relevance vector machine in efficient estimate for basin stability of dynamic networks," *Chaos: An Interdisciplinary Journal of Nonlinear Science* 31.5 (2021): 053129. https://doi.org/10.1063/5.0044899
6. Wu, X., Zheng, Y., **Che, Y.** and Cheng, C. "Pattern recognition and automatic identification of early-stage atrial fibrillation," *Expert Systems with Applications* 158 (2020): 113560. https://doi.org/10.1016/j.eswa.2020.113560
7. **Che, Y.**, Liu, J. and Cheng, C. "Multi-fidelity modeling in sequential design for identification of stability region in dynamic time-delay systems," *Chaos: An Interdisciplinary Journal of Nonlinear Science* 29.9 (2019): 093-105. https://doi.org/10.1063/1.5097934
8. **Che, Y.** and Cheng, C. "Uncertainty quantification in stability analysis of chaotic systems with discrete delays," *Chaos, Solitons & Fractals* 116 (2018): 208-214. https://doi.org/10.1016/j.chaos.2018.08.024